Levels and Diagnostic Value of Model-based Insulin Sensitivity in Sepsis: A Preliminary Study

By: Shukeri, WFWM (Shukeri, Wan Fadziina Wan Muhd) [1,6]; Mat-Nor, MB (Mat-Nor, Mohd Basri) [1]; Jamaludin, UK (Jamaludin, Ummu Kulthum) [2]; Suhaimi, F (Suhaimi, Fatanah) [3]; Abd Razak, NN (Abd Razak, Normy Norafiza) [4]; Railib, AM (Railib, Azrina Md) [1]

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Abstract
Background and Aims: Currently, there is a lack of real-time metric with high sensitivity and specificity to diagnose sepsis. Insulin sensitivity (SI) may be determined in real-time using mathematical glucose-insulin models; however, its effectiveness as a diagnostic test of sepsis is unknown. Our aims were to determine the levels and diagnostic value of model-based SI for identification of sepsis in critically ill patients. Materials and Methods: In this retrospective, cohort study, we analyzed SI levels in septic (n = 18) and nonseptic (n = 20) patients at 1 (baseline), 4, 8, 12, 16, 20, and 24 h of their Intensive Care Unit admission. Patients with diabetes mellitus Type I or Type II were excluded from the study. The SI levels were derived by fitting the blood glucose levels, insulin infusion and glucose input rates into the Intensive Control of Insulin-Nutrition-Glucose model.

Results: The median SI levels were significantly lower in the sepsis than in the nonsepsis at all follow-up time points. The areas under the receiver operating characteristic curve of the model-based SI at baseline for discriminating sepsis from nonsepsis was 0.814 (95% confidence interval, 0.675-0.953). The optimal cutoff point of the SI test was 1.573 x 10(-4) L/mu/min. At this cutoff point, the sensitivity was 77.8%, specificity was 75%, positive predictive value was 73.7%, and negative predictive value was 78.9%. Conclusions: Model-based SI ruled in and ruled out sepsis with fairly high sensitivity and specificity in our critically ill non-diabetic patients. These findings can be used as a foundation for further, prospective investigation in this area.

Keywords
Author Keywords: Critical care; diagnosis; insulin sensitivity; model-based; sepsis
KeyWords Plus: CRITICALLY-ILL; METABOLISM; RESISTANCE; GLUCOSE; ENDOTOXEMIA; GLYCEMIA

Author Information
Reprint Address: Railib, AM (reprint author)

Addresses:
[1] Int Islamic Univ Malaysia, Kulliyyah Med, Dept Anaesthesiol & Intens Care, Kuantan 25200, Pahang, Malaysia
[2] Univ Malaysia Pahang, Dept Mech Engn, Pahang, Malaysia
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